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GENERAL NOTES.

SCIENCE AND LEARNING IN FRANCE*:—A volume with this title has just been published by the Society for American Fellowships in French universities, its purpose being "to put before the American public the contributions of France in all fields of scientific knowledge, and to show her status in the forefront of the world's progress; and, in addition, to furnish to American university students all information bearing on graduate work in France."

This is not the place for an extended review of the volume. We simply call the attention of our readers to it, with the comment that they will find it of the greatest interest and value. The separate chapters are written by specialists—the drafting committee for the short but excellent chapter on astronomy, for example, is Fox, Hale, MacMillan, Moulton and Russell,—and the general editor is Professor John H. Wigmore, of the Northwestern University. The length of the list of sponsors shows how widespread among American scholars is the feeling that American students in the past have unduly neglected the opportunities the French universities present to them for advanced study.

R. G. A.

CATALOGUE AND MEASURES OF DOUBLE STARS DISCOVERED
VISUALLY FROM 1905 TO 1916 WITHIN 105° OF THE
NORTH POLE AND UNDER $5''$ SEPARATION, BY
ROBERT JONCKHEERE.

M. Jonckheere is well known to students of double star astronomy by his long list of discoveries made in the Observatory of the University of Lille, and by his more recent work at Royal Observatory at Greenwich. In the present volume he has made another valuable contribution to his chosen branch of astronomy.

The volume is a supplement to the great General Catalogue of Burnham, published in 1906, in that it contains the visual double stars discovered since 1905. But the work is compiled on somewhat different principles. Burnham included all pairs registered by their discoverers as double, and extended his limit to 120° north polar distance. Jonckheere excludes pairs having an angular separation in excess of $5''$, and stops at 105° north polar distance.

*The volume is on sale by A. C. McClurg & Co., Chicago, sole agents; price \$1.50, cloth bound; \$1.00 stiff paper.

The angular separation limit will, I think, commend itself. It is obvious that discoveries of companions to bright stars at greater distance are hardly to be expected in these days, and for fainter stars the limit of $5''$ is amply large, particularly as the volume is prepared to serve as a working catalog rather than as a comprehensive history. The fact that it comprises 3950 separate entries is sufficient comment on the activity of double star observers during the past decade and on the need for the catalog. The work is conveniently arranged, and the index permits ready reference to the stars discovered by the various observers. A commendable feature is the catalog column giving the B. D. number for each pair bright enough to have such a number. Experience has shown that no other catalog designation is as convenient as this for identification of the fainter stars.

M. Jonckheere's personal contribution to the data in the catalog is a large one. His own discoveries number 1,319, of which only 36 are excluded because their angular separation exceeds $5''$. He has measures at a second epoch of nearly all of these pairs, and at several epochs for some of them, and all of these measures are included, so that the volume, in a sense, supersedes all of his earlier double star lists. All published measures of the discoveries by other observers, as well as M. Jonckheere's own measures of these stars, are given.

In the Introduction an interesting account is given of M. Jonckheere's work at Lille, with a brief description of the Observatory and of the telescope of 35-cm aperture. The present writer is particularly interested to note that only 2 threads are used in the micrometer. This is the number adopted by almost all American double star observers, but European observers generally use micrometers containing a number of threads—including at least one transverse thread. M. Jonckheere finds that the simpler form has distinct advantages:

A short discussion of the distribution of the double stars leads to the conclusion that "the number of close double stars relatively to single stars depends on the star density in a given region. The greater the number of stars the greater the percentage of double to single stars." This is in harmony with the result found by the present writer in 1915* that "close visual double stars are relatively more numerous in the Milky Way than elsewhere in the

*Proceedings National Academy of Sciences, I, 532.

sky." Since the data in the two discussions are different and the method of analysis also different, this conclusion may be regarded as definitely established.

R. G. AITKEN.

July 18, 1917.

BRILLIANT DAYLIGHT METEOR.

This afternoon at about fifteen seconds past four o'clock, a brilliant fire-ball was observed in a direction N 80° W magnetic, from the Flood Building. Its apparent motion was very slow and nearly vertical. The object was completely consumed, burning with an intensely brilliant white light observed in full sunlight against a nearly cloudless sky. The apparent size of the object increased very rapidly as combustion took place. It disappeared at about 9 or 10 degrees above the horizon.

The streak at first was thin and white; afterwards it became irregular in trace, approximating that of a thin cloud, and was observed as such for seventeen minutes.

The prevailing wind at the time was the usual southwesterly afternoon breeze, while the drift of the streak was in a westerly direction. Prof. Alexander McAdie's experiments having shown the depth of the afternoon winds here to be from 2000 to 2500 feet, with upper currents usually from the northwest, it may be argued that the object was completely consumed before it reached the 2500 foot level.

ALLEN H. BABCOCK.

San Francisco, Cal., July 18, 1917.

The following account of the brilliant daylight meteor observed in San Francisco on July 18, 1917, is taken from a personal letter by Captain Lewis. A more precise statement of his observations will be printed in the following number of these *Publications*.

Presidio, San Francisco, Cal.
July 20, 1917.

. It happened that I was facing squarely towards the meteor, aiming an empty gun at the sky, so that I saw the whole phenomenon. The most of my men were watching me. I did not exclaim until the meteor had completed almost half of its flight as I was involuntarily searching the point of origin for some evidence of human agency, and unfortunately, most of the men looked out to the northward across the bay towards a steamer and only located the bearings of the meteor in time to see the last rays of light or the smoke trail. I think nearly twenty men saw the smoke trail in the atmosphere between the fog belt and the house top where it was at its greatest width and lasted only for a few seconds until broken up by the trade winds. The

smoke track above the belt of clouds was very much smaller, due to either perspective or to actual less material. Most of the enlisted men were of the opinion that the smoke trail got smaller as it went up. The impression I formed, after several minutes close observation, was that the trajectory of the meteor was inclined at a very considerable angle to the horizontal and was approaching us from the west. The trajectory lay almost exactly in the vertical plane through our observation point and the point of disappearance of the meteor at the lighthouse keeper's house. The result was the apparent slow vertical motion of the meteor accompanied by rapid increase in size and brilliancy. The rapid diminution in size of the smoke track in the still upper air gave me the perspective effect of a railroad track disappearing over a steep hill.

This question of trajectory can only be settled if we can find some observer to the north or south of the line of flight. Unfortunately Mr. Allen Babcock, who sent me an account of his observation, was at the Flood Building and so nearly in the same vertical plane of observation as myself, that I do not think his bearings will give sufficient angle for intersection. I cannot agree with Mr. Babcock on two points. He described the light as a brilliant white. When I first saw it at the point of origin, it was a very pale orange, it became considerably more reddish as it approached the horizon. The men whom I questioned as to the color of the light all described it as a reddish or yellowish red. These men only saw the latter part of the phenomenon.

I cannot agree with Mr. Babcock's observation that the meteor was entirely consumed at a point nine or ten degrees above the horizon. I have not been able as yet to measure the apparent altitude of the roof of the lighthouse keeper's house but it cannot be higher than two and a half or three degrees and the meteor certainly passed from sight behind this object. The smoke trail was seen in contact with the house by nearly all of the party. I am inclined to think that some fog or cloud possibly obscured the latter part of the phenomenon from Mr. Babcock's observation.

From the hasty observation I was able to make today, it is almost certain that the meteor fell into the sea if it was not consumed as observed by Mr. Babcock. There is a possibility that it may have struck around Point Bonita.

The most striking features of this meteor are its truly enormous size, its great brilliancy and its apparent change in shape. At no time did I see any thing of the nature of a solid with well defined edges and unquestionably a great deal of its apparent width and its elongation in the direction of its flight was due to detached blazing gases.

GEORGE C. LEWIS,
Capt. D. O. L., 63d Inf.